

Wind Energy & Reliability

How windpower keeps the lights on despite variable winds

What happens when the wind isn't blowing? It's a common question as windpower expands in the Midwest. Wind is a growing part of our electric portfolio, and now represents over 25% of electricity used in Iowa and South Dakota. Thankfully, utilities and grid operators can effectively integrate large amounts of wind into our power mix. An understanding of how the power grid operates can provide more insight.

Five Key Facts About Reliability

Our electric grid is like one big machine. Power is the only product that is simultaneously produced and consumed, and utilities operate integrated power grids covering millions of people in multiple states.

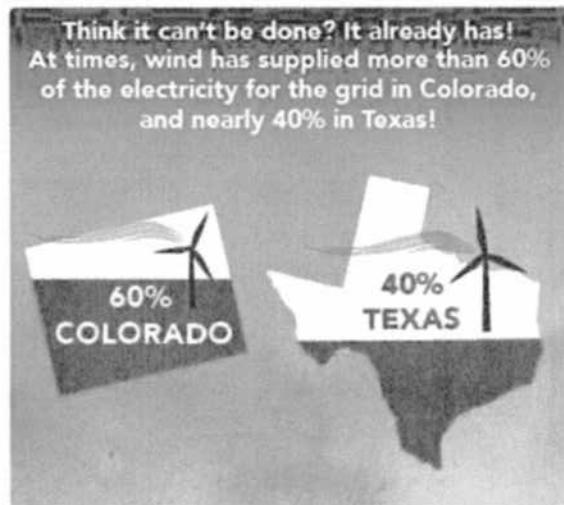
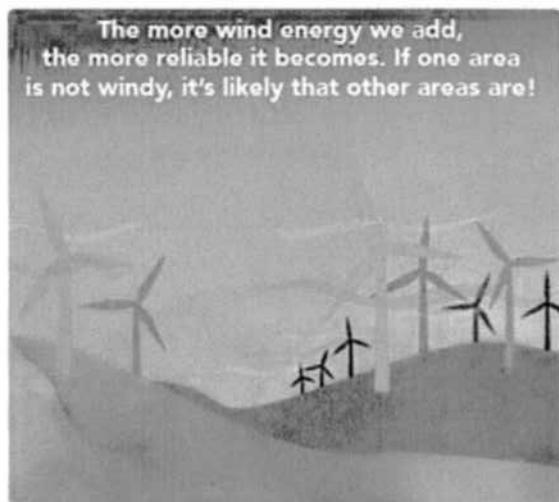
Consumer demand fluctuates constantly, but it's predictable. Grid operators know how to ensure generation will be available when needed. They already adapt to changes across huge regions by ramping power plants up and down to match demand. This ensures the grid has enough juice to meet our needs 24/7/365.

Wind energy is variable but predictable, and utilities can integrate it using existing strategies and technologies. Changes in wind output happen gradually and predictably, and wind farms can forecast their output to deliver power to the grid as needed.

Fossil fuel plants are unreliable too. Technical problems, fuel shortages and safety concerns can cause abrupt failures and outages at any power plant. These are much harder for utilities to manage than any wind farm's gradual, predictable variability.

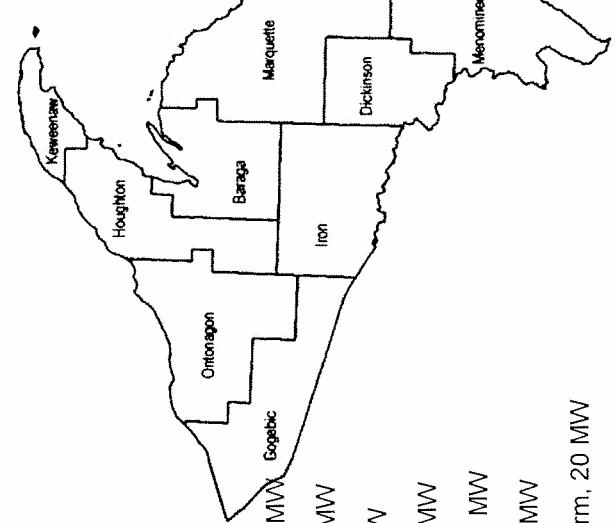
More turbines = less variability. The wind is always blowing somewhere. Even if one area with a wind farm is not very windy one day, another area will be, and their changes in output can cancel each other out. That's why a large, robust grid is essential.

Let's work together to create a more reliable, balanced electric portfolio with wind energy!

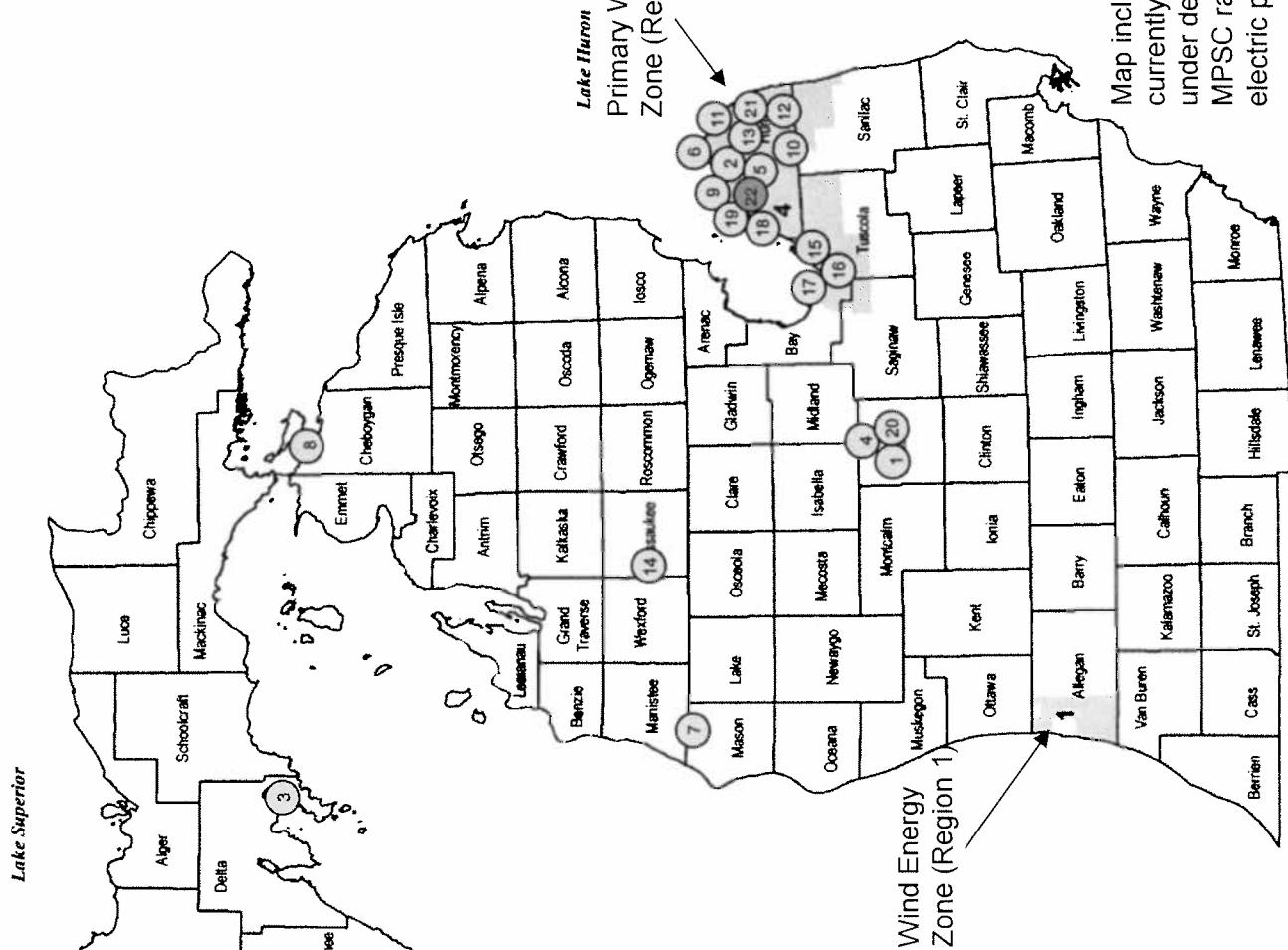


Information and graphics courtesy of the American Wind Energy Association. www.awea.org

Michigan Wind Farms



- (1) Beebe Wind, 81 MW
- (20) Beebe 1B, 50.4 MW
- (21) Big Turtle, 20 MW
- (19) Brookfield, 74.8 MW
- (16) Crosswinds, 105 MW
- (2) Echo Wind, 112 MW
- (3) Garden Wind Farm, 20 MW
- (4) Gratiot County Wind, 212.8 MW
- (5) Harvest I Wind, 52.8 MW
- (6) Harvest II Wind, 59.4 MW
- (7) Lake Winds Energy Park, 100.8 MW
- (8) Mackinaw City, 1.8 MW
- (9) McKinley, 14.4 MW
- (10) Meade, 100.3 MW
- (11) Michigan Wind I, 69 MW
- (12) Minden, 32 MW
- (13) Michigan Wind II, 90 MW
- (18) Pheasant Run Wind, 74.8 MW
- (14) Stoney Corners, 60 MW
- (15) Sigel, 64 MW
- (13) Tuscola Bay Wind, 120 MW
- (17) Tuscola Bay Wind II, 100 MW
- (15) 1523.7 MW Total Operational
- (16) Under Development



Map includes wind farms currently operating or under development for MPSC rate-regulated electric providers.

● Currently Operational
○ Under Development

Michigan Utility Scale Wind Farms*								
Project Name	County	Capacity (MW)	Turbine Size (MW)	Number of Turbines	Turbine Manufacturer	Developer	Power Purchaser	Commercial Operation Date
Beebe	Gratiot	81	2.4	34	Nordex	Exelon & Great Lakes Wind	Consumers Energy	December 2012
Beebe 1B	Gratiot	50.4	2.4	21	Nordex	Exelon	Municipal Utility	December 2014
Big Turtle	Huron	20	2.0	10	Gamesa	Heritage Sustainable Energy	DTE	December 2014
Brookfield	Huron	74.8	1.7	44	GE Energy	NextEra Energy	DTE	February 2014
Cross Winds	Tuscola	105.4	1.7	62	GE Energy	Consumers Energy	N/A	December 2014
Echo	Huron	112	1.6	70	GE Energy	DTE	N/A	September 2014
Garden I	Delta	28	2.0	14	Gamesa	Heritage Sustainable Energy	Consumers Energy & DTE	September 2012
Gratiot County	Gratiot	212.8	1.6	133	GE Energy	Inverenergy & DTE	DTE	June 2012
Harvest	Huron	52.8	1.65	32	Vestas	Exelon	Wolverine Power Cooperative	2008
Harvest II	Huron	59.4	1.8	33	Vestas	Exelon	Consumers Energy	November 2012
Lake Winds	Mason	100.8	1.8	56	Vestas	Consumers Energy	N/A	November 2012
Mackinaw City	Emmet	1.8	0.9	2	NEG Micon	Mackinaw Power	Consumers Energy	2001
McKinley	Huron	14.4	1.6	9	GE Energy	DTE	N/A	December 2012
Meade	Huron	100.3	1.7	59	GE Energy	DTE	N/A	2015/2016
Michigan Wind I	Huron	69	1.5	46	GE Energy	Exelon	Consumers Energy	2008
Michigan Wind II	Sanilac	90	1.8	50	Vestas	Exelon	Consumers Energy	January 2012
Minden	Sanilac	32	1.6	20	GE Energy	DTE	N/A	December 2012
Pheasant Run Wind	Huron	74.8	1.7	44	GE Energy	NextEra Energy	DTE	December 2013
Sigel	Huron	64	1.6	40	GE Energy	Detroit Edison	N/A	December 2012
Stoney Corners	Missaukee & Oceola	60	2 - 2.5	29	Repower, Fuhrlander, Northern Power Systems	Heritage Sustainable Energy	Consumers Energy DTE, Traverse City Light & Power	October 2012
Tuscola Bay Wind	Tuscola, Bay & Saginaw	120	1.6	75	GE Energy	NextEra Energy	DTE	December 2012
Tuscola Wind II	Tuscola & Bay	100.3	1.7	59	GE Energy	NextEra Energy	DTE Electric	November 2013
Total		1,624.0 MW		942 Turbines				
Operational Totals		1,523.7 MW		883 Turbines				

* Bold text indicates the wind farm is operational.

* Prepared by MPSC Staff and includes all wind farms operational, planned or under contract with an MPSC-rate-regulated electric provider. Additional wind farms are included as MPSC Staff becomes aware of the project.